

國立中央大學數學系

專題演講

主 講 人：吳沛遠副教授 (臺灣大學電機工程學系)

演講題目：A Tutorial on Analyzing Machine Learning Algorithms

演講茶會：2025年09月25日(星期四) 3:30 p.m. ~ 4:00 p.m.

茶會地點：中央大學鴻經館M306

演講時間：2025年09月25日(星期四) 4:00 p.m. ~ 5:00 p.m.

演講地點：中央大學鴻經館M107

Abstract :

This talk explores several foundational and emerging concepts at the intersection of machine learning theory, optimization, and reinforcement learning. We begin by presenting a novel perspective that frames self-taught reasoning in large language models (LLMs) through the lens of Markov chains, offering a probabilistic interpretation of multi-step in-context learning. We then investigate the convergence behavior of gradient descent under adversarial conditions, showing that with carefully controlled step sizes, gradient-based methods can still converge to the optimum even in the presence of perturbations, provided the objective satisfies smoothness and Polyak-Łojasiewicz (PL) conditions. Transitioning to sequential decision-making, we revisit the principle of Optimism in the Face of Uncertainty (OFU) and its implications for exploration strategies. We introduce a regret analysis of the Upper Confidence Bound (UCB) algorithm in the linear bandit setting, highlighting key theoretical guarantees. Finally, we examine the Least-Squares Value Iteration (LSVI) framework and its UCB-augmented variant (LSVI-UCB), which bridges supervised learning and reinforcement learning with provable exploration efficiency. Together, these topics emphasize the importance of structure, robustness, and principled exploration in modern learning systems.

敬 請 公 告 ， 歡 迎 參 加